U.S. Department of Health and Human Services

Agency for Healthcare Research and Quality
Advancing Excellence in Health Care ● www.ahrq.gov

The Healthcare Cost and Utilization Project (HCUP)

Overview of the HCUP Databases

Agency for Healthcare Research and Quality
Webinar ♦ September 10, 2014

Webinar Overview

- Project Overview
- HCUP Partners
- The Making of HCUP Data
- HCUP State Databases
- HCUP Nationwide Databases
- How to Obtain HCUP Data & Access HCUP Resources

Research Using HCUP Data

Costs of care	**Septicemia was the most expensive reason for hospitalization in 2012—totaling over $20 billion in aggregate hospital costs (NIS)**
Access to care	Americans in low-income areas visit EDs at rates 90 percent higher compared to those in the highest income areas (NEDS)
Quality of care	From 2004 to 2009, the overall inpatient mortality rate for hospital admissions with heart attack decreased significantly overall and for both genders and all expected payment sources (NIS)
Readmissions	For CHF, schizophrenia, and renal failure, at least 1 in 5 patients were readmitted within 30 days (SID with readmissions link)
Patient Safety	In 2009, postoperative sepsis occurred in 15 of 1,000 elective-surgery admissions of length 4 or more days, age 18 and over United States (NIS and PSI)
Geographic variation	ED visits were higher in counties with fewer primary care MDs per capita (SEDD)

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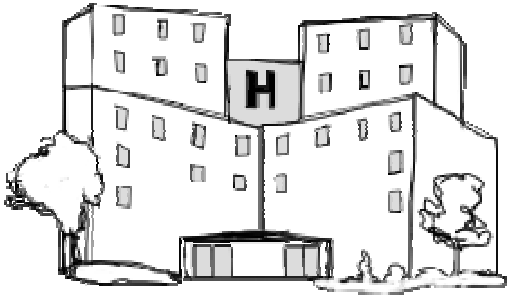
The HCUP Partnership

State

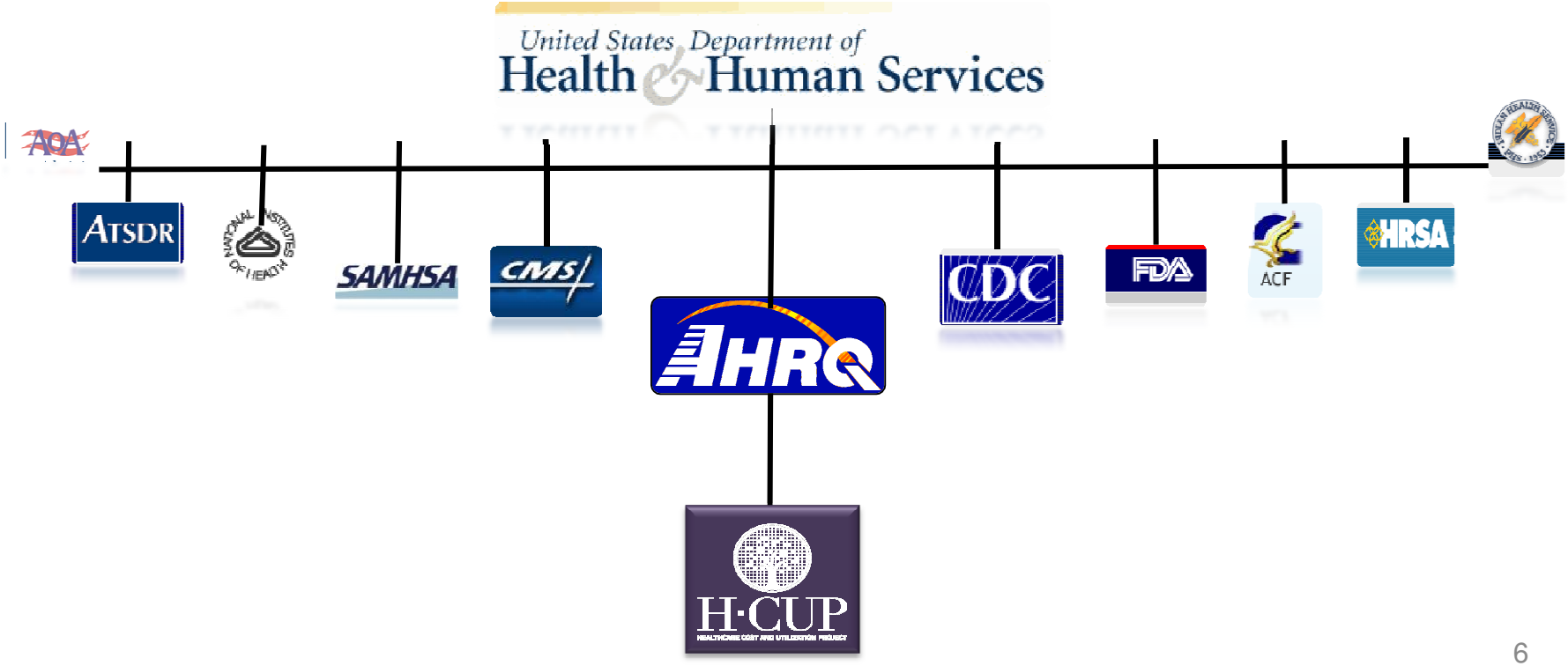
Federal



Industry

What is the Agency for Healthcare Research and Quality (AHRQ)?

The Agency for Healthcare Research and Quality (AHRQ) is a federal agency under the Department of Health and Human Services.



Current HCUP State Partners

Alaska State Hospital and Nursing Home Association
Arizona Department of Health Services
Arkansas Department of Health
California Office of Statewide Health Planning & Development
Colorado Hospital Association
Connecticut Hospital Association
Florida Agency for Health Care Administration
Georgia Hospital Association
Hawaii Health Information Corporation
Illinois Department of Public Health
Indiana Hospital Association
Iowa Hospital Association

Current HCUP State Partners

Kansas Hospital Association

Kentucky Cabinet for Health and Family Services

Louisiana Department of Health and Hospitals

Maine Health Data Organization

Maryland Health Services Cost Review Commission

Massachusetts Center for Health Information and Analysis

Michigan Health & Hospital Association

Minnesota Hospital Association

Mississippi Department of Health

Missouri Hospital Industry Data Institute

Montana MHA – An Association of Montana Health Care Providers

Nebraska Hospital Association

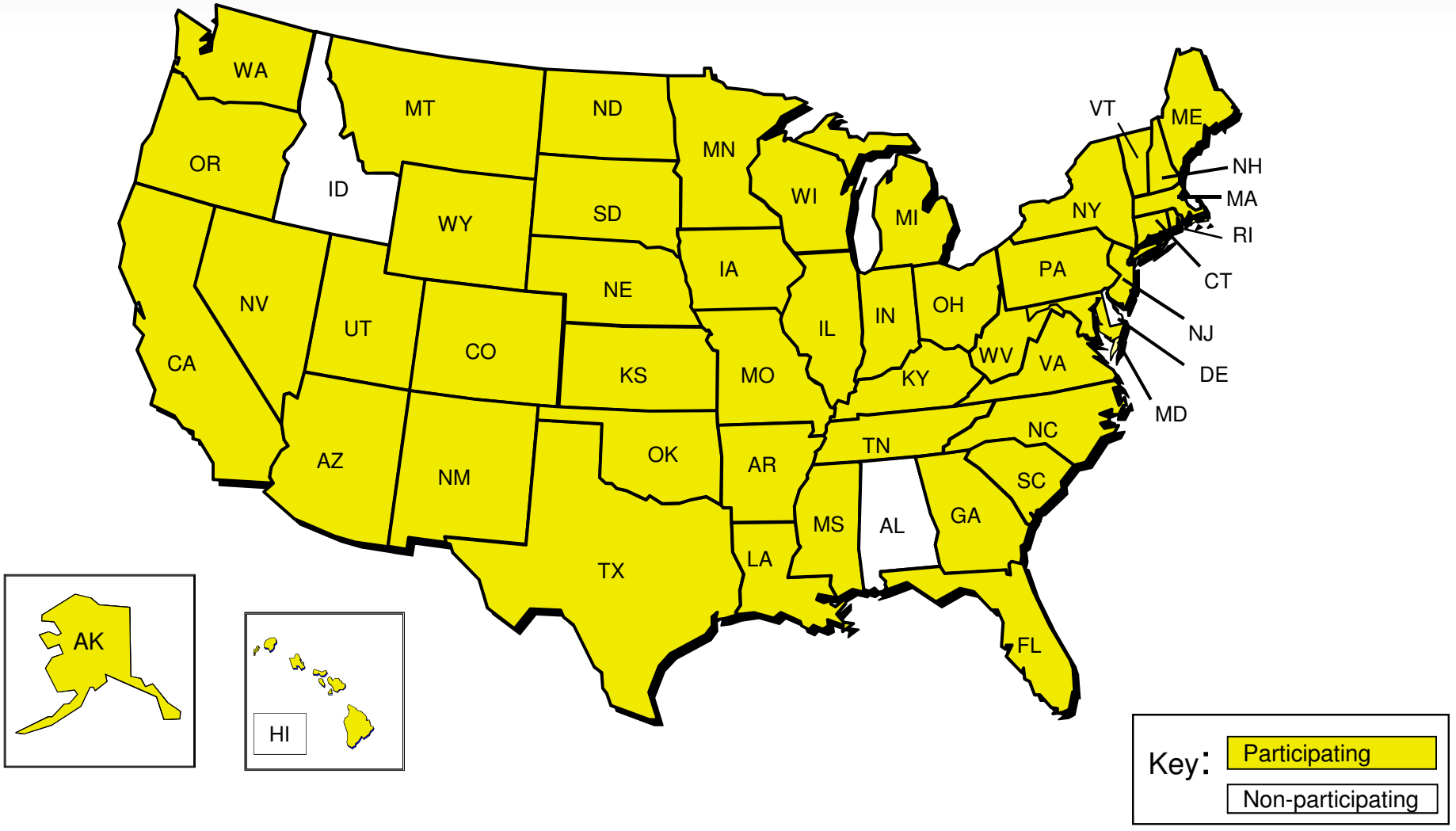
Current HCUP State Partners

Nevada Department of Health and Human Services
New Hampshire Department of Health & Human Services
New Jersey Department of Health
New Mexico Department of Health
New York State Department of Health
North Carolina Department of Health and Human Services
North Dakota Data Provided by Minnesota Hospital Association
Ohio Hospital Association
Oklahoma State Department of Health
Oregon Association of Hospitals and Health Systems
Oregon Health Authority
Pennsylvania Health Care Cost Containment Council
Rhode Island Department of Health
South Carolina State Budget & Control Board

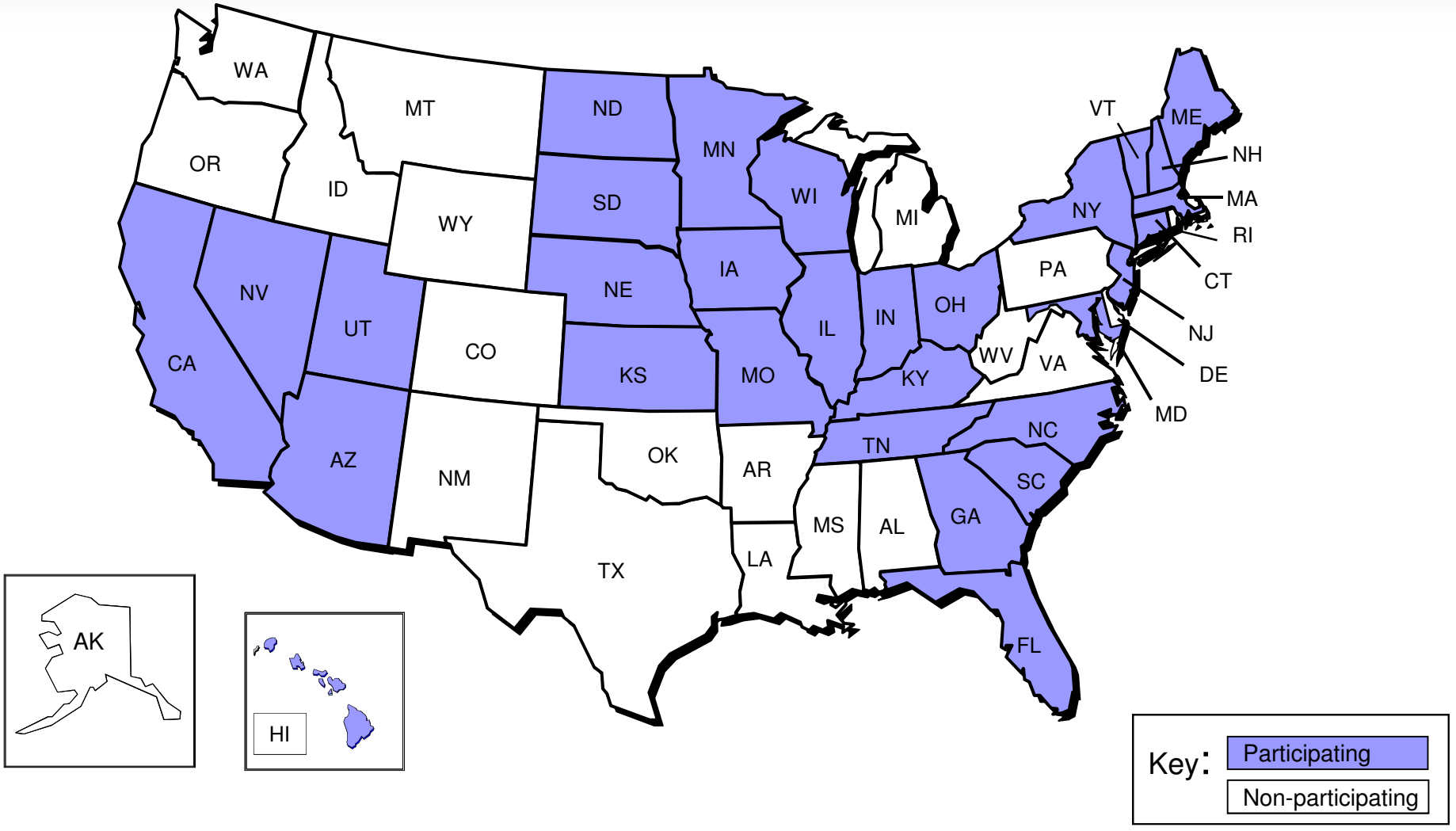
Current HCUP State Partners

South Dakota Association of Health Care Organizations
Tennessee Hospital Association
Texas Department of State Health Services
Utah Department of Health
Vermont Association of Hospitals and Health Systems
Virginia Health Information
Washington State Department of Health
West Virginia Health Care Authority
Wisconsin Department of Health Services
Wyoming Hospital Association

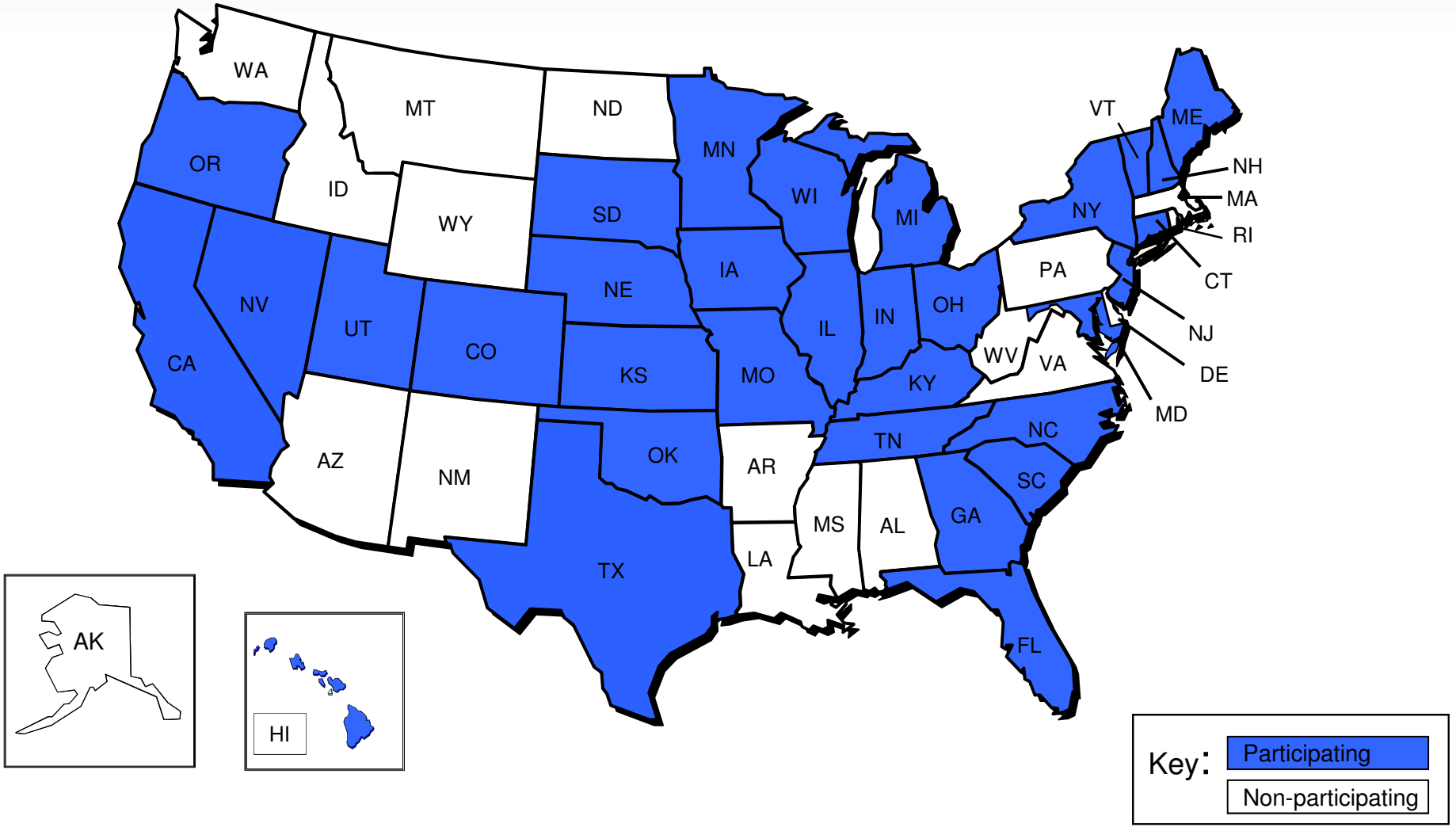
HCUP Partners Providing 2012 Inpatient Data



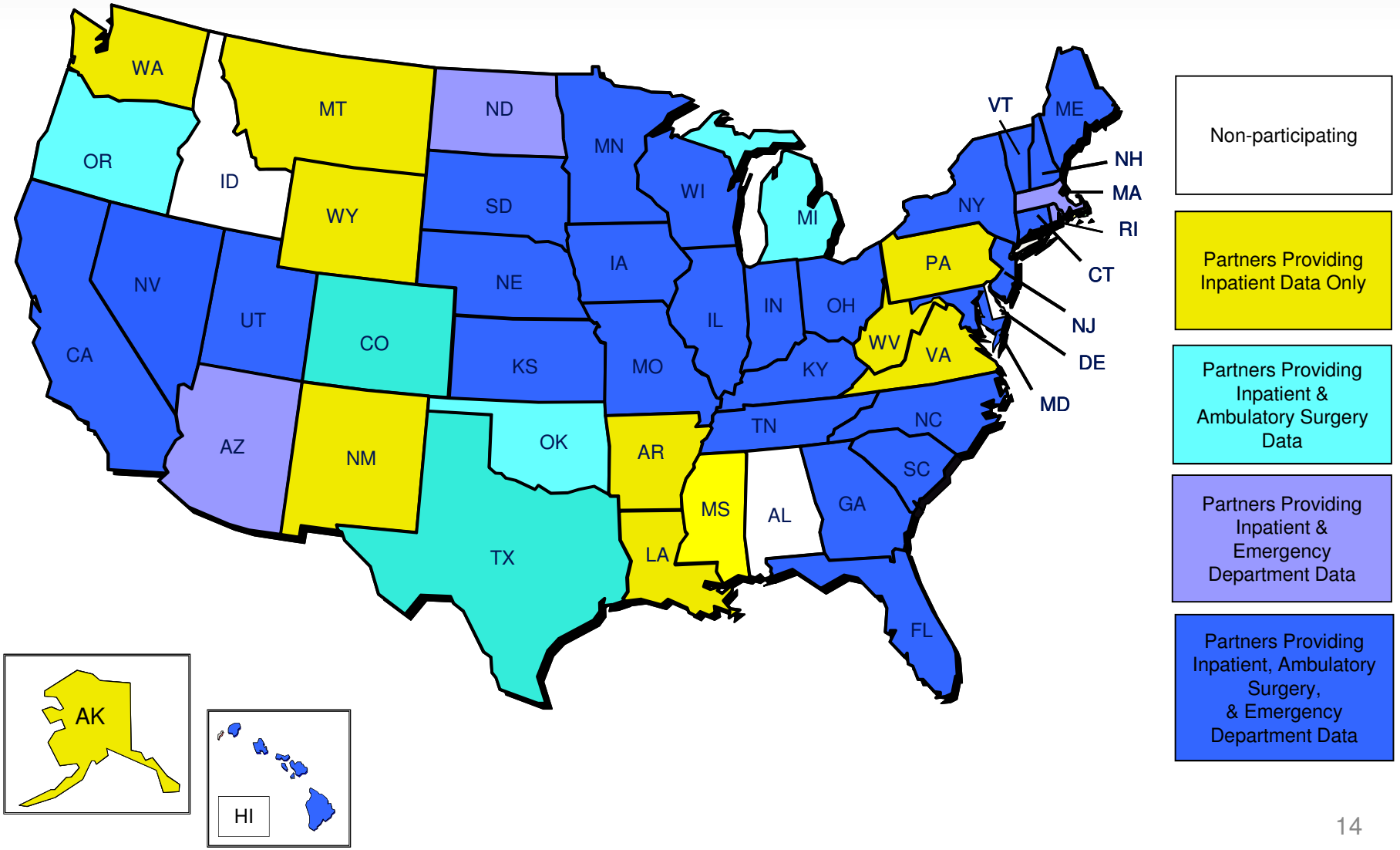
HCUP Partners Providing 2012 Emergency Department Data



HCUP Partners Providing 2012 Ambulatory Surgery and Services Data



Partnership: HCUP Database Participation By State



Today's Objectives

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The Foundation of HCUP Data is Hospital Billing Data

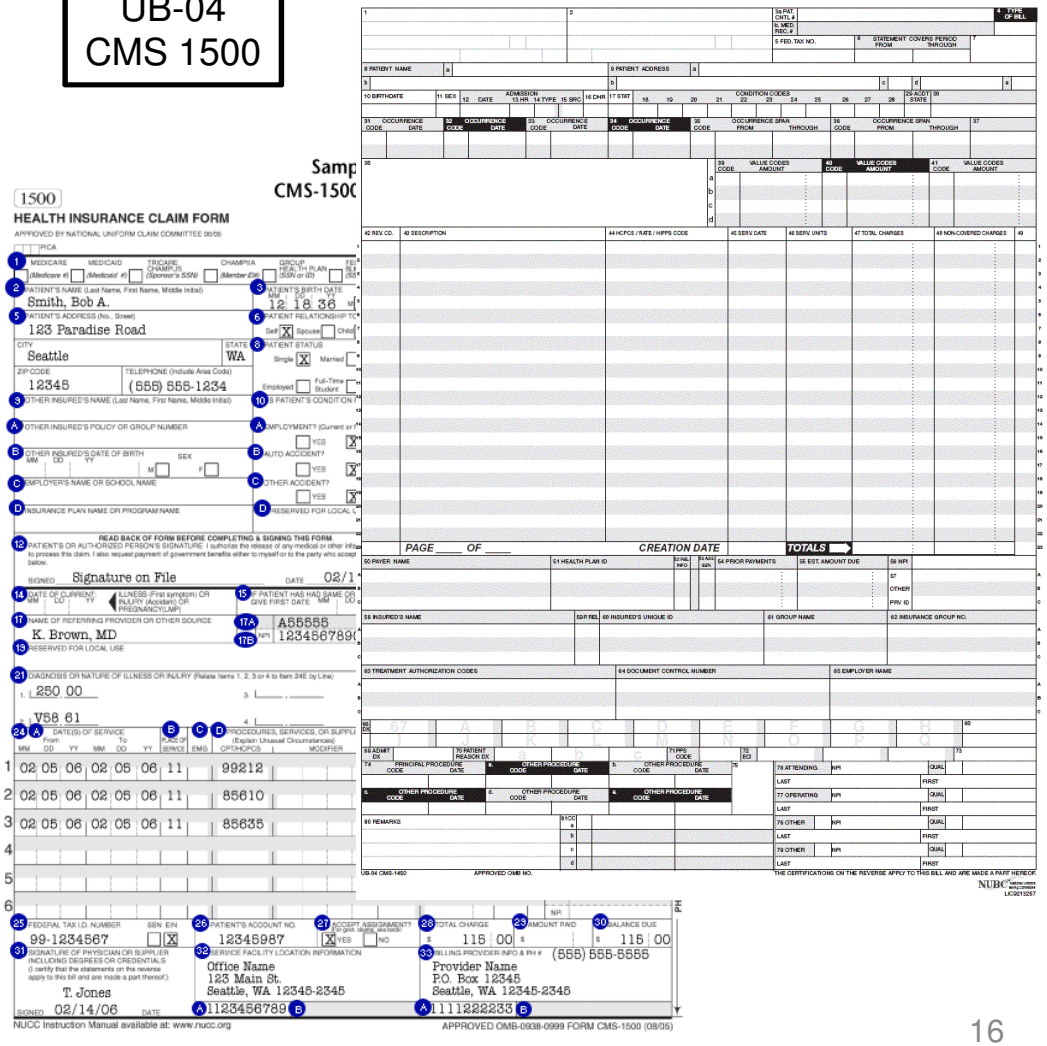
UB-04
CMS 1500

Demographic Data

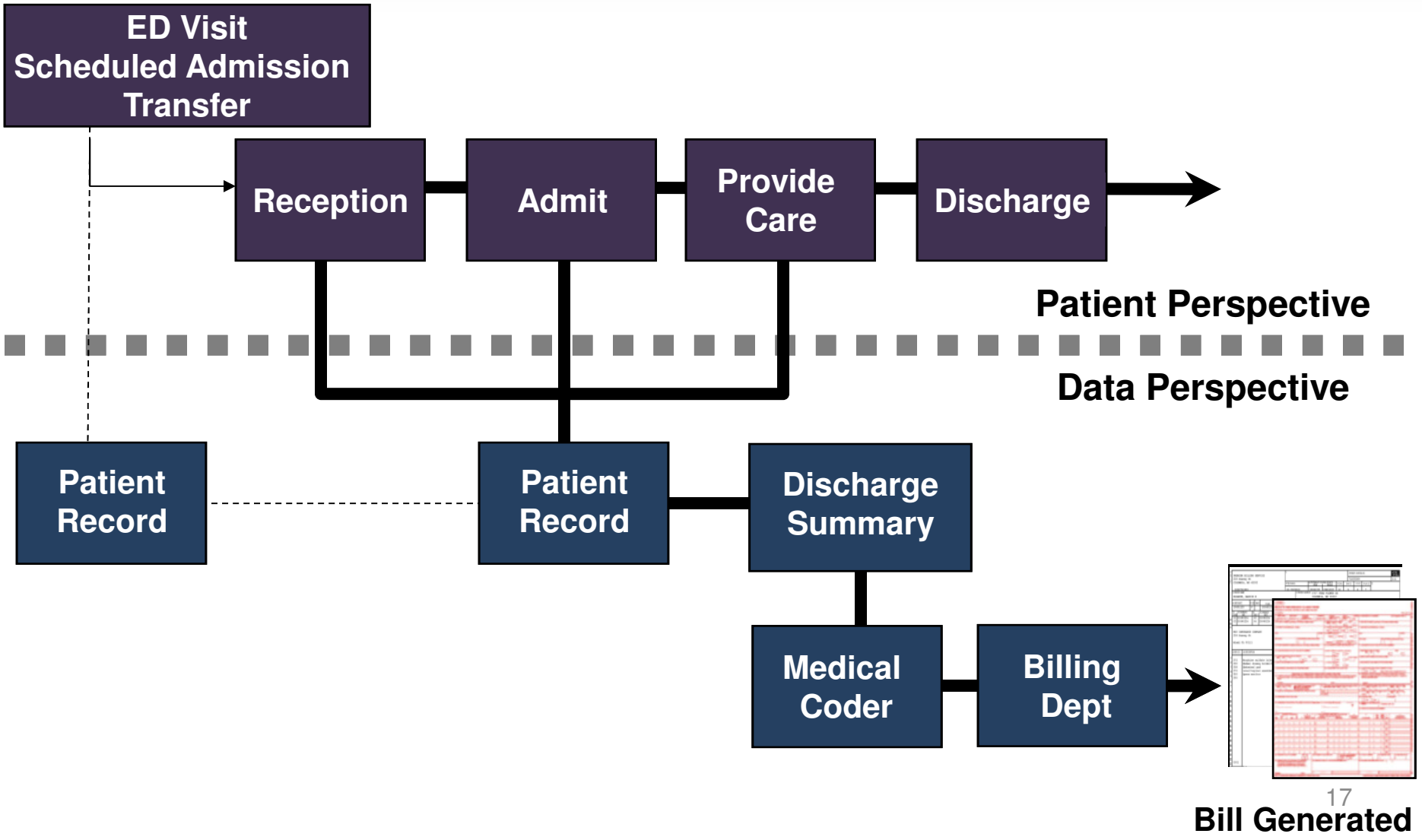
Diagnoses

Procedures

Charges

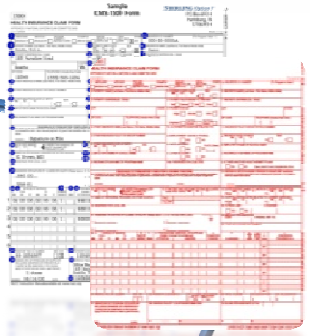


From Patient Hospital Visit to HCUP Record



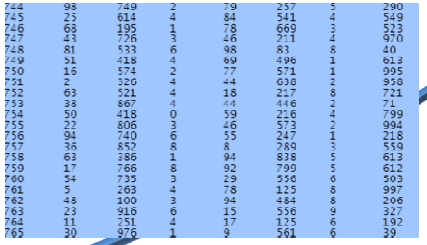
The Making of HCUP Data

Patient enters hospital



Billing record created

Hospital sends billing data and any additional data elements to data organizations



States store data in varying formats

AHRQ standardizes data to create uniform HCUP databases

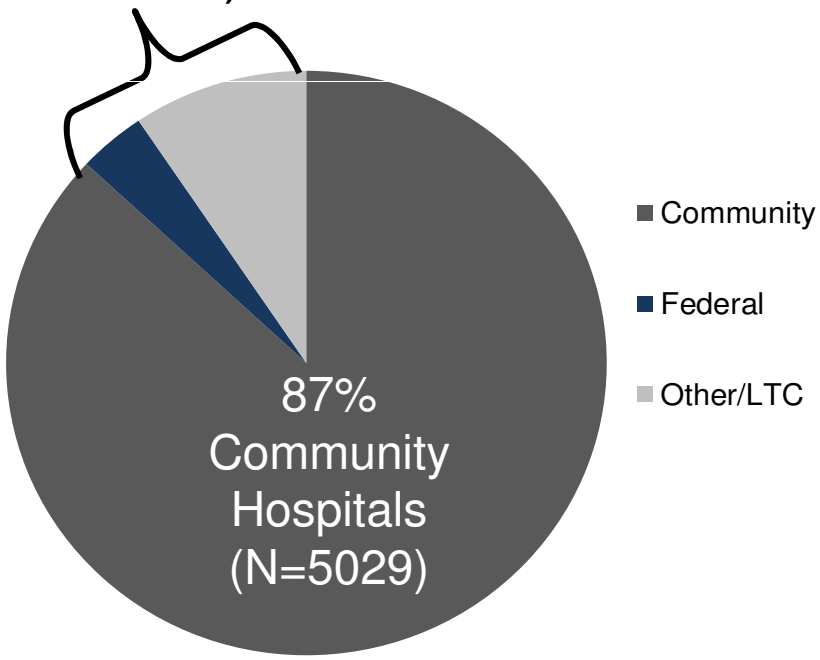
The HCUP Data Process

- State data is mapped to a standardized HCUP format which allows for consistent data elements and values across States for comparison
- Additional data elements are added:
  - Value-added variables – injury indicators, chronic condition indicators, procedure class
  - Hospital characteristics – teaching status, ownership/control, bed size
  - Diagnostic related groups and severity measures –
    - AHRQ's Clinical Classification Software (CCS)
    - 3M's All Patient Refined DRGs (APR-DRGs)
- Quality checks are performed

Hospitals in the U.S.

- 87% of hospitals in the U.S. are community hospitals

13% Non-community hospitals (Federal (DOD/VA/IHS), psychiatric, non-federal long term care, etc.)



Source: American Hospital Association (AHA), 2011

What Are Community Hospitals?

American Hospital Association Definition:

Non-Federal, short-term, general, and other specialty hospitals, excluding hospital units of other institutions (e.g., prisons)

Included	Excluded
Multi-specialty general hospitals	Long-term care
OB-GYN	Psychiatric
ENT	Alcoholism/Chemical dependency
Orthopedic	Rehabilitation
Pediatric	DoD / VA / IHS
Public	
Academic medical centers	

What are Community Hospitals?

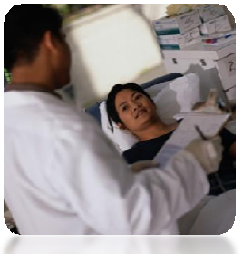
- HCUP generally does not receive data from non-community hospitals.
- However, if a patient is treated in a community hospital, their information is included.

Most Frequent Principal Diagnosis	Number of Discharges (thousands)
1. Newborns	3,817
2. Pneumonia	1,113
3. Septicemia	1,093
4. Congestive heart failure	970
5. Osteoarthritis	964
6. Mood disorders	895
7. Cardiac dysrhythmias	795

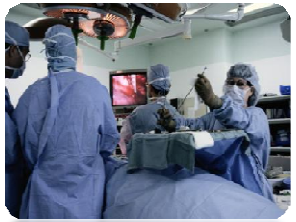
Source: Nationwide Inpatient Sample, 2011

HCUP Has 6 Types of Databases

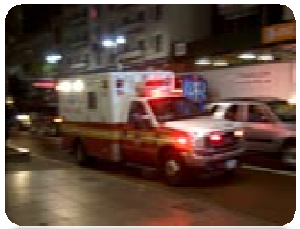
- Three state-level databases



State Inpatient Databases (SID)

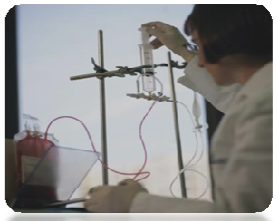


State Ambulatory Surgery & Services Databases (SASD)



State Emergency Department Databases (SEDD)

- Three nationwide databases



National (Nationwide) Inpatient Sample (NIS)

Nationwide Emergency Department Sample (NEDS)

Kids' Inpatient Database (KID)

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HCUP State Databases

State Inpatient Databases (SID)	All inpatient hospital discharge data (including those admissions that started in the ED) from participating HCUP States
State Ambulatory Surgery & Services Databases (SASD)	Ambulatory surgery data (hospital based and some freestanding) and other outpatient services from participating HCUP States
State Emergency Department Databases (SEDD)	Emergency department data (treat and release) from participating HCUP States

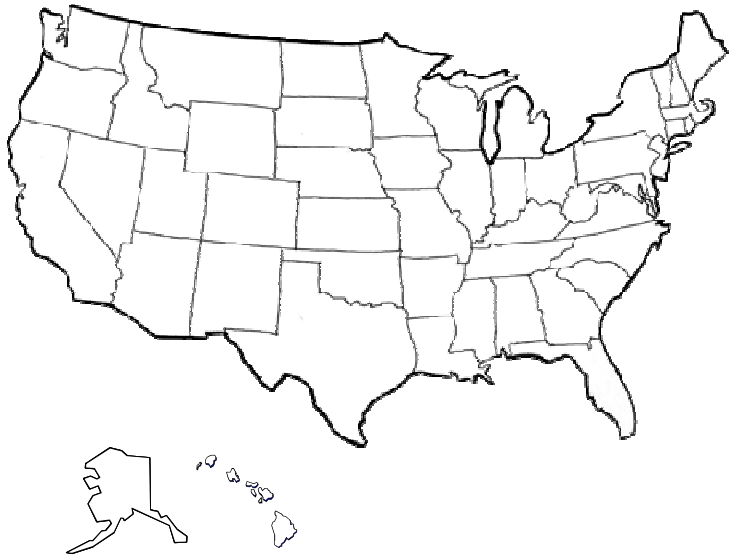
What Data Elements are included in the HCUP databases?

Data Elements:

- Patient demographics (age, sex)
- Diagnoses & procedures
- Expected payer
- Length of stay
- Patient disposition
- Admission source & type
- Admission month
- Weekend admission

Some Data Elements Vary by State

- Race/Ethnicity
- Patient county
- Patient ZIP Code
- Severity of illness
- Birthweight
- Procedure date (days from admission)
- Health plan details
- Additional expected payers
- Detailed charges
- Patient identifiers encrypted
- Physician identifiers encrypted
- Physician specialty
- Hospital identifier unencrypted



Example: Payer Detail Varies by State

PAY1_X		PAY1 (Standardized)	
Value	Description	Value	Description
010	Medicare	1	Medicare
011	Medicare (HMO)		
012	Medicare (Managed care - Other)		
013	Medicare (fee for service)		
020	Medi-Cal	2	Medi-Cal
021	Medi-Cal (HMO)		
022	Medi-Cal (Managed care - Other)		
023	Medi-Cal (fee for service)		
030	Private Coverage	3	Private insurance
031	Private Coverage (HMO)		
032	Private Coverage (Managed care - Other)		
033	Private Coverage (fee for service)		
08n, where n=0-3	Self-pay	4	Self-pay
--		5	No charge

Example: Race Detail Varies by State

RACE_X		RACE (Standardized)	
Value	Description	Value	Description
1	White	1	White
2	Black	2	Black
3	Hispanic	3	Hispanic
4	Hawaiian	4	Asian or Pacific Islander
5	Chinese		
6	Filipino		
7	Japanese		
8	Other Asian		
9	Other Pacific Islander		
10	Native American	5	Native American
11	Mixed or Other	6	Other

Partner State Files vs. HCUP State Files

- HCUP State Files vs. Data Files received directly from the State

HCUP State Files	Partner State Files
Subset of data elements	All data elements
Value-added data elements	May not have same value-added elements
Uniformly coded across the states	Not uniformly coded across states
Standard data quality checks	Variability in quality checks by state
Lag time	More timely

States Releasing Databases through HCUP Central Distributor

- Arizona
- Arkansas
- California
- Colorado
- Florida
- Hawaii
- Iowa
- Kentucky
- Maine
- Maryland
- Massachusetts
- Michigan
- Mississippi
- Nebraska
- Nevada
- New Jersey
- New Mexico
- New York
- North Carolina
- Oregon
- Rhode Island
- South Carolina
- South Dakota
- Utah
- Vermont
- Washington
- West Virginia
- Wisconsin

Remember:

Not all states participate in all years and for all databases

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HCUP Nationwide Databases

National (Nationwide) Inpatient Sample (NIS) — NIS Redesign	Inpatient discharge data for a **sample of discharges from all hospitals** in SID
Kids' Inpatient Database (KID)	Pediatric inpatient hospital discharge data from a **sample of pediatric discharges** in SID
Nationwide Emergency Department Sample (NEDS)	Emergency department data (treat and release & admitted) from a sample of hospitals in SID and SEDD

NIS Redesign

- The 2012 National Inpatient Sample (NIS) is a *sample of discharges from all hospitals* in HCUP equal to approximately 20% of all discharges in U.S. community hospitals
- The previous NIS was comprised of *all discharges from a 20% sample of U.S. community hospitals* drawn from the HCUP State Inpatient Databases and included 100% of discharges from those hospitals

2012 NIS is a Stratified Sample of Discharges from the SID

State Inpatient Databases (SID)

2012 SID
~ 4,380 hospitals
~ 34.3M records

Strata

- U.S. Division
- Urban/Rural Location
- Teaching Status
- Ownership/Control
- Bed Size

Stratified Sample of Discharges

*State not included in the stratum

Within strata sort by hospital, DRG, and admission month and select 1 in 5 records

2012 National Inpatient Sample (NIS)

N = ~ 4,380 hospitals
~ 7.3M records

KID is a Stratified Sample of Discharges from the SID

2012
State
Inpatient
Databases
(SID)

~ 4,380 hospitals
~ 34.3M records

Strata

- Uncomplicated Births
- Complicated Births
- Pediatric Non-Births

Stratified Sample
of Discharges

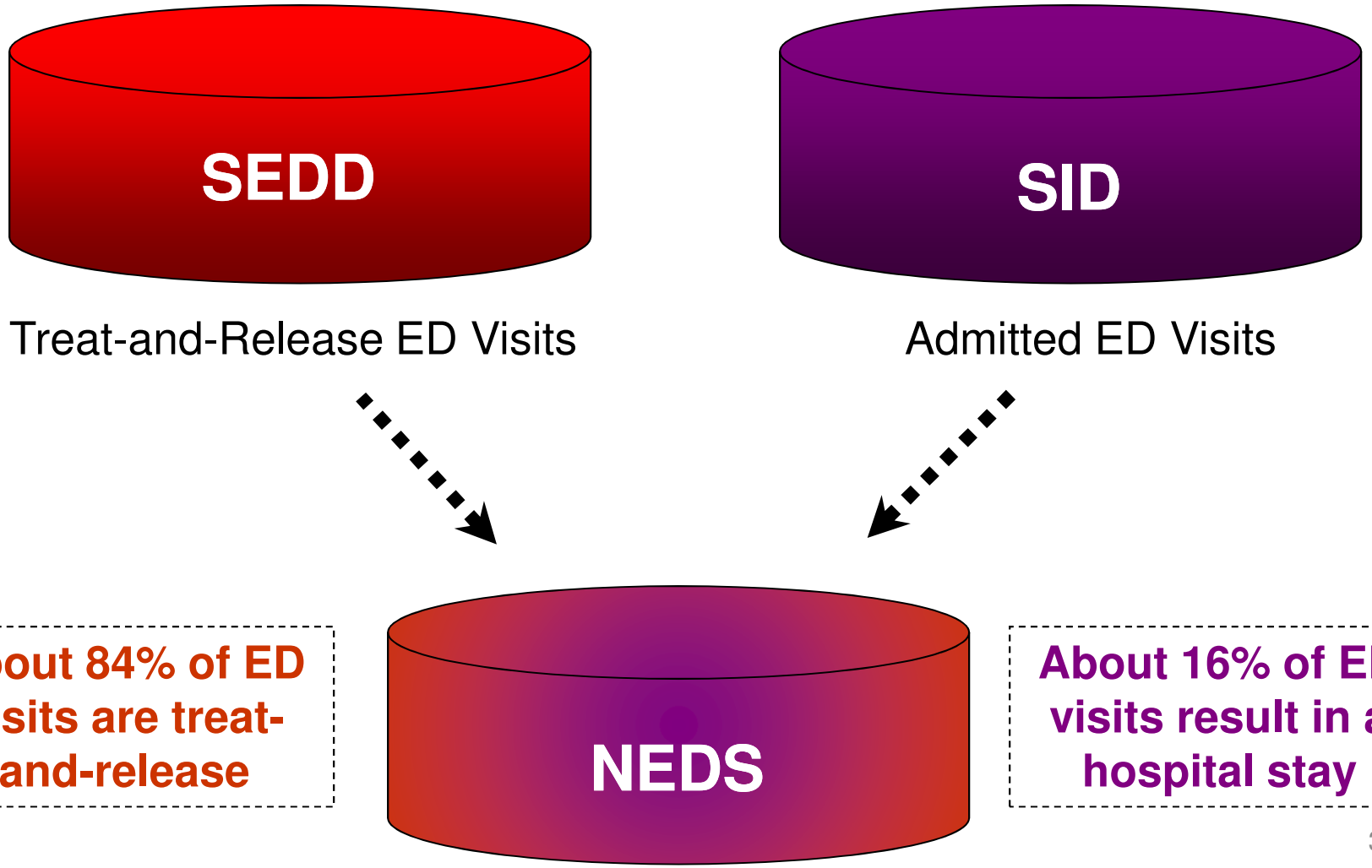
*State not included in the stratum

- 10% uncomplicated births
- 80% pediatric discharges

2012
Kids' Inpatient
Database
(KID)

N = ~ 4K hospitals
~ 3M records

HCUP NEDS Data



NEDS is a Stratified Sample of Hospitals from the SEDD and SID

2011
State
Inpatient
Databases
(SID)
State
Emergency
Department
Databases
(SEDD)

Strata

- U.S. Region
- Urban/Rural Location
- Teaching Status
- Ownership/Control
- Trauma center

Stratified Sample of Hospitals

*State not included as stratum

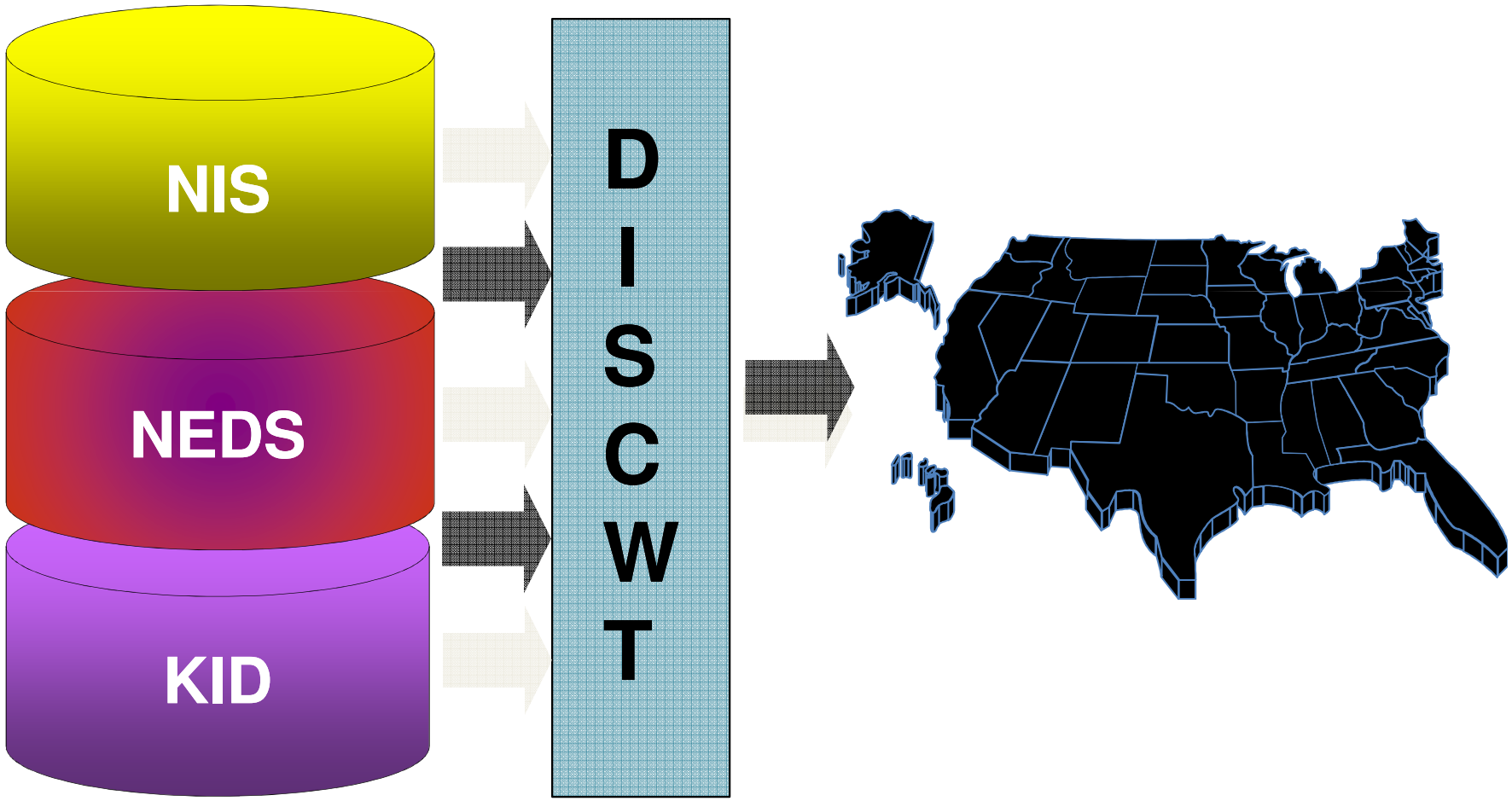
2011
Nationwide
Emergency
Department
Database
(NEDS)

N = ~ 1K hospitals
~ 29M records

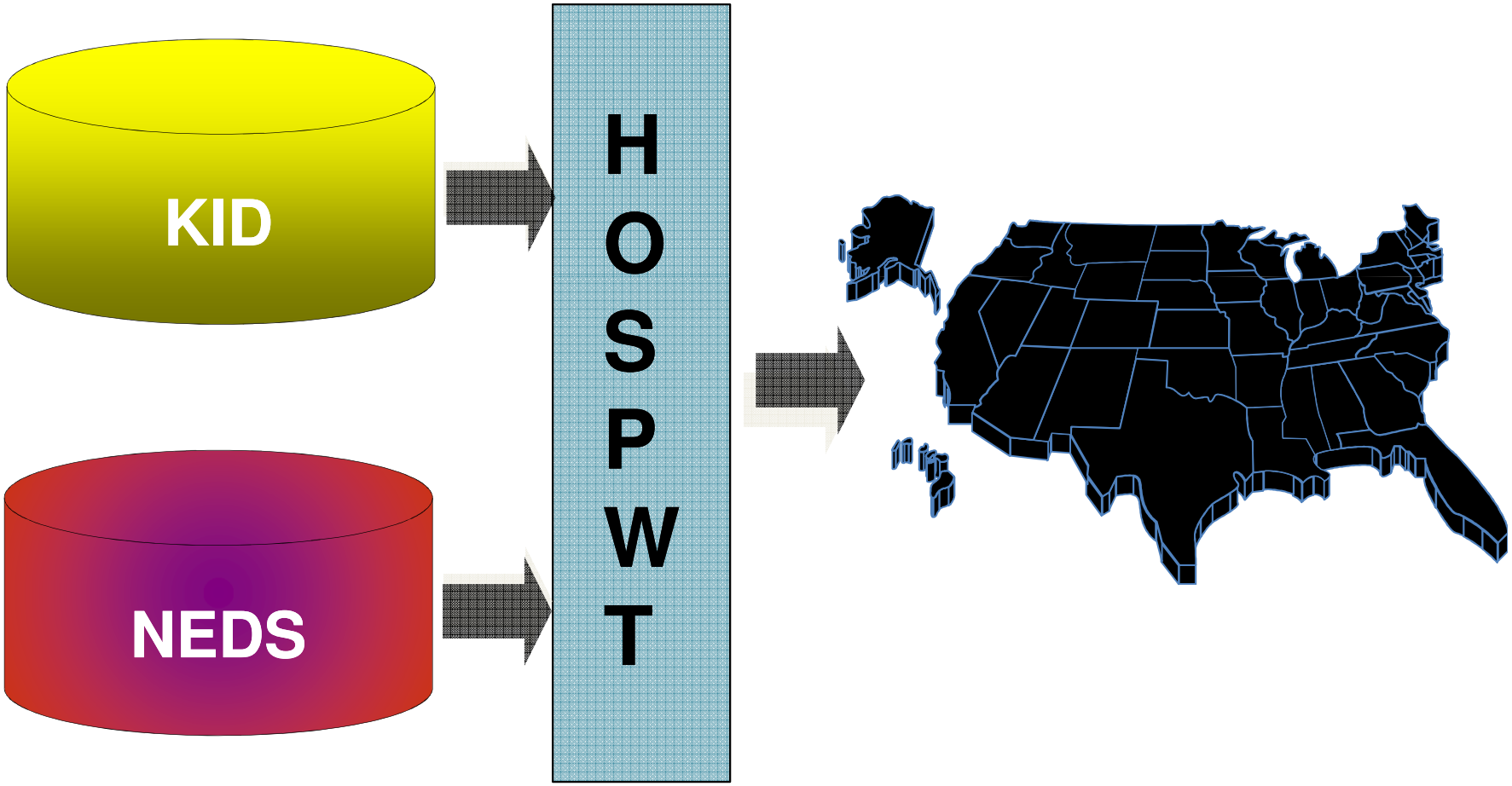
NEDS-Specific Variables

- Type of ED event: treated and released, admitted to the same hospital, transferred, died (**EDEVENT**)
- Disposition of patient from ED (**DISP_ED**)
- Died in the ED: died in the ED, died in the hospital, did not die (**DIED_VISIT**)
- Diagnosis reported on record indicates self harm (**INTENT_SELF_HARM**)
- Trauma center level I, II, or III (**HOSP_TRAUMA**)
- HCUP ED hospital identifier (**HOSP_ED**)

NIS, NEDS, KID: Must be Weighted to Produce National and Regional Estimates



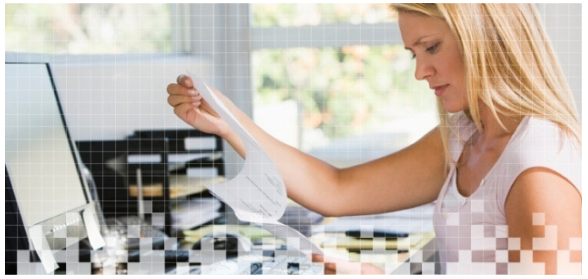
KID and NEDS: Must be Weighted to Produce National and Regional Estimates



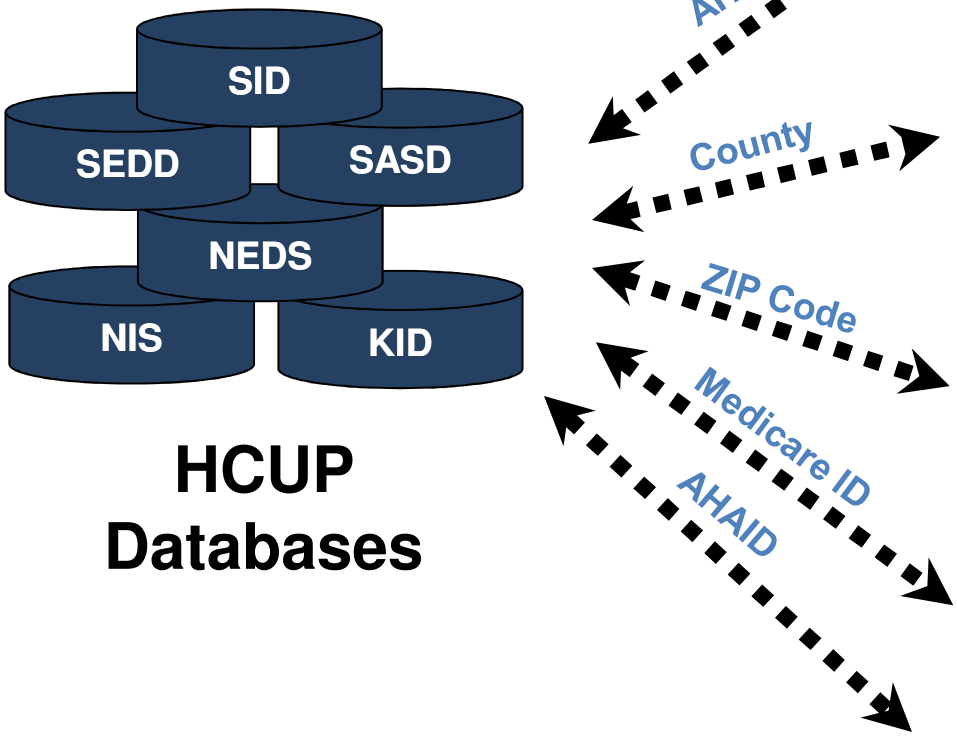
What Types of Care Are and Are Not Captured by HCUP?

Included in HCUP	
Inpatient Care	State Inpatient Databases (SID) National (Nationwide) Inpatient Sample (NIS) Kids' Inpatient Database (KID)
Emergency Department	State Emergency Department Databases (SEDD) Nationwide Emergency Department Sample (NEDS)
Ambulatory Surgery & Services	State Ambulatory Surgery & Services Databases (SASD)

Not Included in HCUP
Physician office visits
Pharmacy
Labs/Radiology



Some Limitations Can be Addressed by Linking to Other Databases



American Hospital Association (AHA) Annual Survey

Health Resources and Services Administration's (HRSA) Area Health Resource File (AHRF)

Zip Code Files from Census or Vendor

Medicare Cost Reports

Trauma Information Exchange Program (TIEP)

What is HCUP and What Is It Not?

HCUP is…	HCUP is NOT…
Discharge database for health care encounters	A survey
All payer, including the uninsured	Specific to a single payer, e.g. Medicare
Hospital, ambulatory surgery, emergency department data	Office visits, pharmacy, laboratory, radiology
All hospital discharges	Only a sample
Accessible multiple ways: raw data, regular reports, online	Just another database

Hospital Billing Data Have Benefits and Limitations

Benefits
Large number of visit records
Uniformity of coding
Routine, regular collection
Ease of access
All-payer
Available at local, state, regional and national level
Supplemental files available to facilitate research

Limitations
Differences in coding across hospitals
Limited clinical details
Lack revenue information
May not include all hospitals
May not show complete experience of care
No data on individuals outside of hospital system

Summary

- Six types of HCUP databases
- Databases are based on administrative hospital data: inpatient, ED, and ambulatory surgery and services
- Available for multiple years
  - Nationwide
    - NIS (1988-2012)
    - NEDS (2006-2011)
    - KID (1997, 2000, 2003, 2006, 2009, 2012)
  - State
    - SID (1990-2012)
    - SASD (1997-2012)
    - SEDD (1999-2012)
- Can look at breadth of health care issues
- Can be linked to external files

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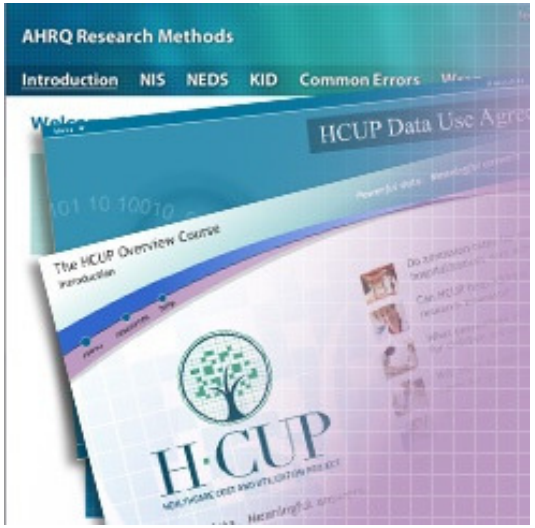
The HCUP Database Process

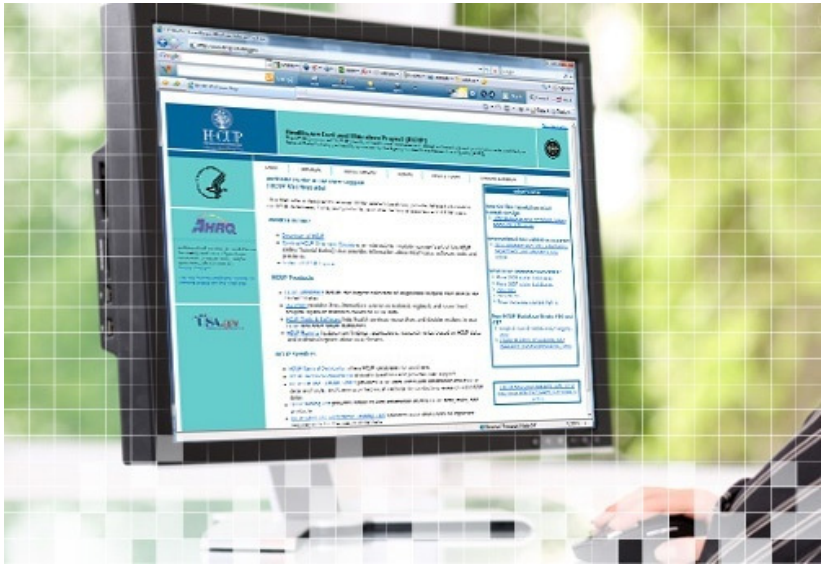
- Processed data sent to HCUP Partners

- State databases may become available to public through:
  - State Data Organization

    OR
  - HCUP Central Distributor



To Purchase HCUP Data
Two Methods



Method 1
HCUP Central Distributor
www.hcup-us.ahrq.gov/tech_assist/centdist.jsp

Method 2
HCUP Partner States
www.hcup-us.ahrq.gov/partners.jsp

Purchase Data Through the HCUP Central Distributor

- **Step 1: Download and complete application kit:**
  http://www.hcup-us.ahrq.gov/tech_assist/centdist.jsp

- **Step 2: Obtain more information (if needed):**
  Phone: 866-556-HCUP (4287) toll free
  E-mail: HCUPDistributor@ahrq.gov

- **Step 3: Take Data Use Agreement (DUA) on-line training and sign DUA**

- **Step 4: Send order form, signed DUA, and payment to HCUP Central Distributor**

Additional Requirement: Electronic Data Use Agreement (DUA) Course

- **Purpose of the Course:**
  - **Emphasize the importance of data protection**
  - **Reduce the risk of inadvertent violations**
  - **Describe your individual responsibility when using HCUP data**

Takes 15 minutes to Complete

http://www.hcup-us.ahrq.gov/DUA/new2013/index.htm

Pricing Information Per Data Year

Nationwide Databases (NIS, KID, NEDS)

- **NIS**: $350 (2007-2012; student price $50)
  $160-200 (earlier years; student price $20)
- **KID**: $350 (2009 and 2012; student price $50)
  $200 (earlier years; student price $20)
- **NEDS**: $500 (student price $75)

National data free to Government agencies

State Databases (SID, SASD, SEDD)

- Varies by state, database, year, and type of applicant
- $35 - $3,185

All funds for State data sales returned to State partners

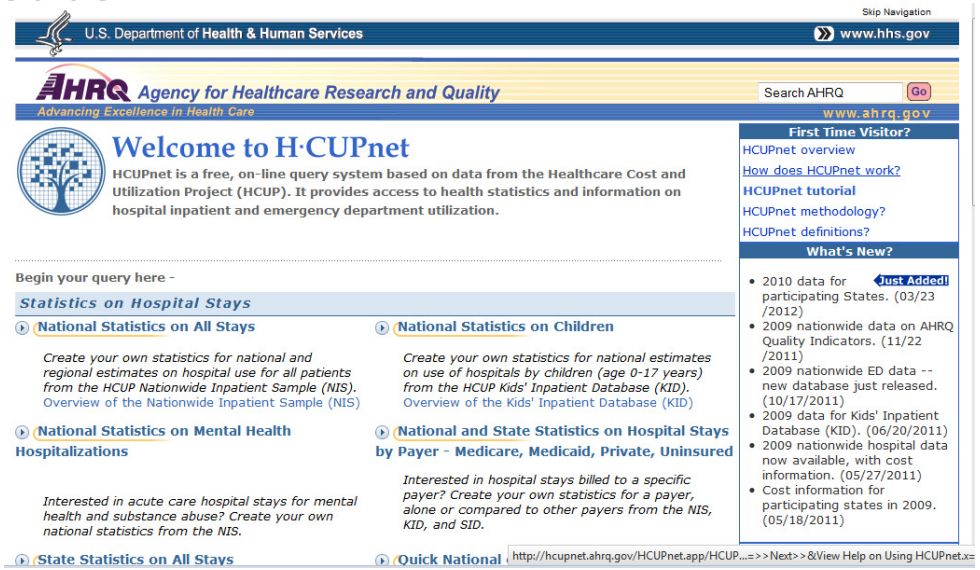
Software Requirements of Working with the Full HCUP Files

Software Package	Load Programs	Format Programs	Example Statistical Coding	HCUP Tools Programs
SAS	X	X	X	X
STATA	X		X	X
SPSS	X			X
SUDAAN			X	

MS Excel and Access are NOT GOOD Options!

HCUPnet: Quick, Free Access to HCUP Data

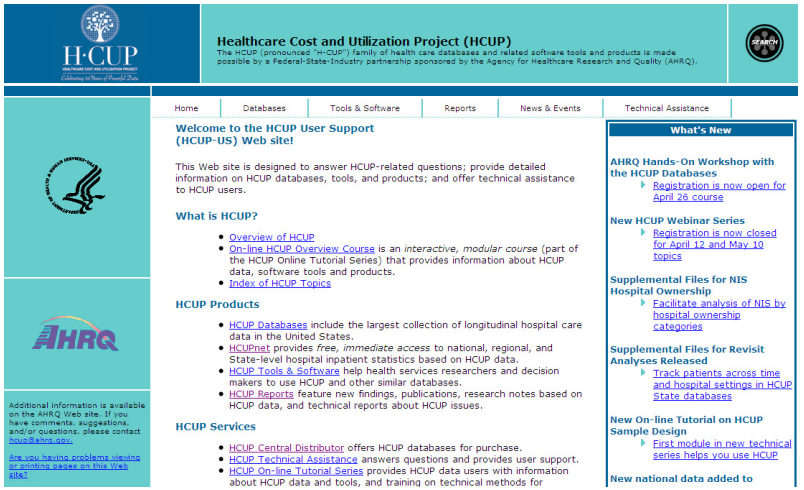
- **Free online query system**
- **Users generate tables of outcomes by diagnoses and procedures**
- **Data can be cross-classified by patient and hospital characteristics**



http://hcupnet.ahrq.gov

HCUP User Support Web Site

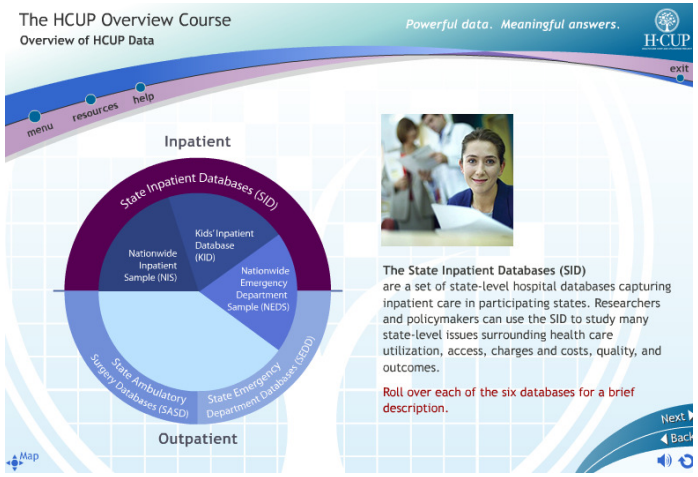
- Find detailed information on HCUP databases, tools, and products
- Access HCUPnet
- Find comprehensive list of HCUP-related publications, database reports, and fact books
- Access technical assistance

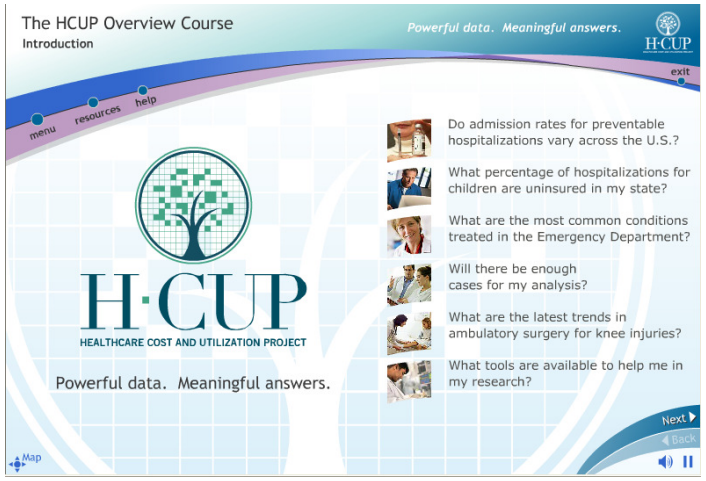


http://www.hcup-us.ahrq.gov

Interactive On-line HCUP Overview Course Available

- Provides information about HCUP data, software tools, and products
- Length 90 min





http://www.hcup-us.ahrq.gov/overviewcourse.jsp

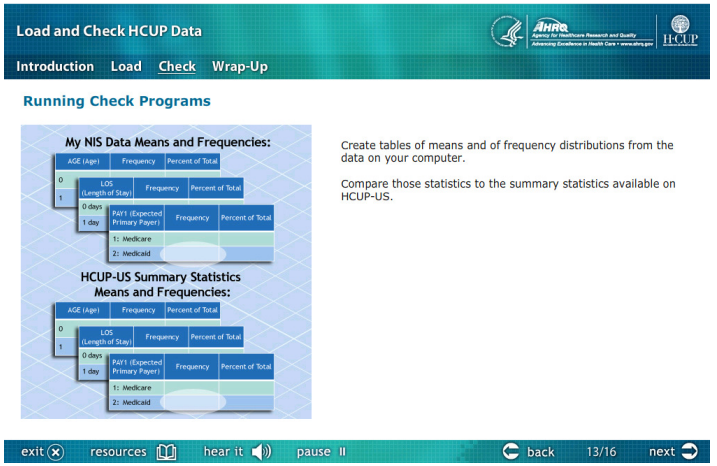
HCUP Sample Design

- Tutorial explains the sampling strategy of the three nationwide databases – the NIS, KID, and NEDS
- Length 30 min

http://www.hcup-us.ahrq.gov/tech_assist/tutorials.jsp

Load and Check HCUP Data

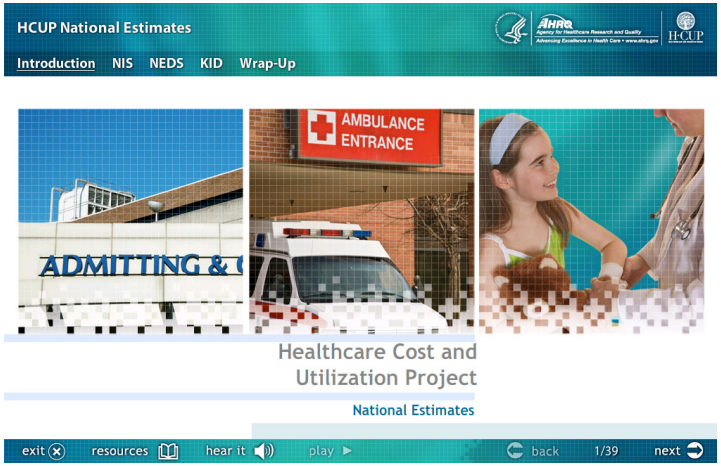
- Provides instructions on how to unzip HCUP data, save it on your computer, and load data into a statistical software package
- Length 20 min



http://www.hcup-us.ahrq.gov/tech_assist/tutorials.jsp

Producing National HCUP Estimates

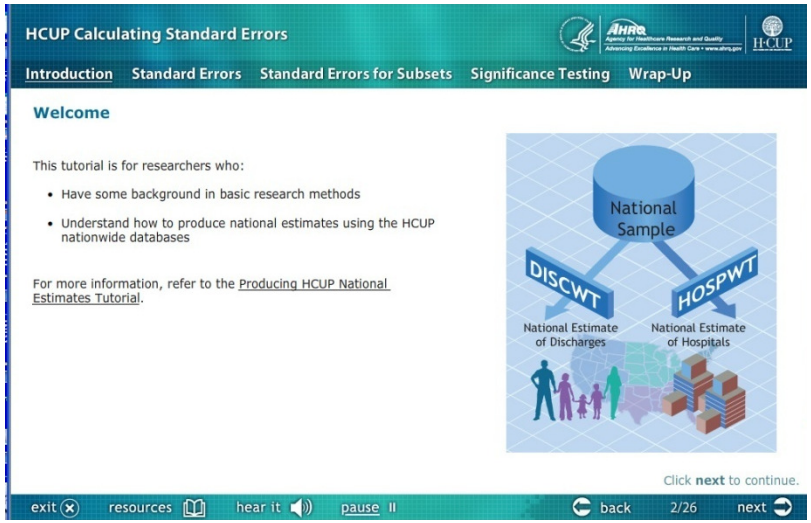
- Explains how to produce national estimates from the three nationwide databases (NIS, NEDS, KID)
- Length 45 min



http://www.hcup-us.ahrq.gov/tech_assist/tutorials.jsp

Calculating Standard Errors

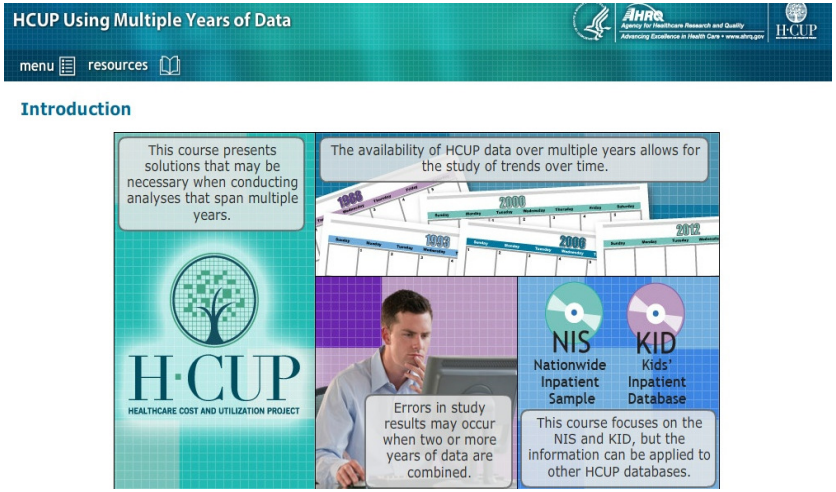
- Explains how to accurately determine the precision of the estimates produced from the HCUP nationwide databases
- Length 30 min



http://www.hcup-us.ahrq.gov/tech_assist/tutorials.jsp

Multi-Year Analysis

- Describe problems that may arise when using multiple years of HCUP data and provides solutions for addressing these issues
- Length 30 min



http://www.hcup-us.ahrq.gov/tech_assist/tutorials.jsp

Using HCUP Technical Assistance

Active Technical Assistance

- Responds to inquiries about HCUP data, products, and tools
- Collects user feedback and suggestions for improvement

E-mail: hcup@ahrq.gov

Join the HCUP Email List

- HCUP Newsletter, published quarterly
  - User Tech Tips
  - Upcoming Events
- New Data Releases
- New Reports

http://www.ahrq.gov/data/hcup/hcuplist.htm

HealthCare Cost and Utilization Project (HCUP)

H·CUP

HEALTHCARE COST AND UTILIZATION PROJECT

Questions/Comments?

Time for Questions and/or Comments.